

WASHINGTON

# SCIENCE TRENDS

HIGHLIGHTS

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\* AN ANNIVERSARY

With this issue, Washington SCIENCE TRENDS begins its third year of publication -- an appropriate time to convey our gratitude to our many subscribers both in the U. S. and overseas. Unlike publications which depend upon advertising or Government subsidy, SCIENCE TRENDS is -- and will continue to be -- an independent and objective service for readers who plan, manage or market technical programs and projects. As we look ahead for new ways to be of service your comments or suggestions would be greatly appreciated. Once again, we thank you!

\* SPACEFLIGHT LAUNCHINGS

Here are the key dates now being put into final form for the Ranger series of lunar and interplanetary launchings by the National Aeronautics and Space Administration:

- ✓ Ranger I - On or about April 28, 1961
- ✓ Ranger 2 - Approximately 90 days later
- ✓ Ranger 3 - Lunar Impact -- October 26 - 29, 1961
- ✓ Ranger 4 - January 23 - 27, 1962
- ✓ Ranger 5 - April 22 - 25, 1962

In addition, NASA is tentatively planning probes to the vicinity of Mars for October 26 or November 10, 1962 and to Venus, August 17, 1962. Later tentative launchings include Mars, November 29 - December 19, 1964 and Venus, March 26 - April 15, 1964.

These programs are being carried out primarily by or through the Jet Propulsion Laboratory, California Institute of Technology. JPL has designed a communications system for the first Ranger spacecraft consisting of a 250 milliwatt transmitter and a 3 watt transponder. The transmitter will telemeter engineering and scientific measurements and may be used to provide tracking data with respect to two direction angles and one-way doppler. The high power transponder will provide two-way doppler in addition to the angular information, will receive commands from Earth, and will also telemeter engineering and scientific data, over greater distances. Motorola is currently building this unit. For more distant planetary missions, JPL expects to add to the system a 25 watt amplifier. For advanced space missions, JPL is considering a special digital data transfer communications link, possibly an adaptation of the Collins Kineplex system.

BACK ISSUES AVAILABLE! SEE SPECIAL FORM THIS ISSUE!

#### \* SUBMARINE ATMOSPHERE PURIFICATION

Experts at the Naval Research Laboratory, Washington 25, D. C. believe that present air-monitoring, conditioning and ventilation systems for nuclear submarines "are not yet sufficiently reliable" for wartime cruises.

In particular, they have warned, the present carbon dioxide "scrubber" has worrisome limitations resulting from the use of a toxic absorbent material in a system whose design will not permit immediate conversion to use of a less toxic, although less efficient material. In addition, knowledge of toxic conditions during long dives is said to be "woefully inadequate" and the need for constant attention and servicing is viewed as a possible serious source of failures.

Among their recommendations:

- ✓ Adequate research budgets and prompt installation of advanced equipment.
- ✓ Immediate action on large-capacity electrostatic precipitators.
- ✓ Support of two major self-contained, continuously operating oxygen systems, now in the development stage: The nickel-cadmium "split cell" oxygen generator and the sulfate-cycle method of generating oxygen and absorbing carbon dioxide. If tests indicate feasibility, an algae system should also be developed.

#### Among continuing investigations at NRL

- ✓ Studies of methods of air sampling and analysis.
- ✓ Refinements on the Mark III Atmosphere Analyzer.
- ✓ Readyng a Freon Leak Detector for manufacture by a contractor.
- ✓ Studies of the composition of submarine aerosols.
- ✓ Investigation of methods for improving the catalytic combustion properties of Hopcalite.
- ✓ Development of appropriate specifications for optimum water-thinned paints for painting submarine interiors while away from port.

NRL has put forth the concept of an "ideal" integrated system in which air from the submarine atmosphere is passed through an electrostatic precipitator for the removal of aerosols. The precipitator should be larger than 11,000 cfm in capacity to reduce the aerosol concentration from about 0.5 to 0.1 microgram per liter. A portion of this air would then be passed through the catalytic combustion unit which would oxidize the carbon monoxide hydrogen and organic vapors. Any dust arising in the process would be removed by a suitable particulate filter.

Passage over the cooling coils of the air conditioner would reduce the temperature of the outlet gas and at the same time condense out some moisture. Traces of residual organic vapor could then be reduced by absorption on activated carbon. In this type of system, the carbon would be protected from high concentrations of organic vapors which have made such carbons relatively ineffective in the past. In this method, it is suggested, the carbon would not only serve a valuable purpose but would retain its effectiveness for much longer periods of time.

(NRL has now published a comprehensive report covering much of the past and present research effort in this field. 167 Pages. NRL Report 5465 dated April, 1960 is available through military channels or at \$3 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

## TECHNICAL TRENDS

□ Contrails of jet aircraft are "invisible" from the ground as the result of developmental work by the Air Force Cambridge (Mass.) Research Laboratory. Water vapor from the burning jet fuel is mixed with tiny hygroscopic particles in the engine exhaust. The resulting vapor trail is said to be made up of particles too small to be seen. ✓✓✓ A 27 percent increase in range is expected to result from installation of Pratt & Whitney J-52 engines in the improved Navy A4D-5 Skyhawk built by Douglas Aircraft, El Segundo, Calif. ✓✓✓ Information on new, lower price schedules for cobalt 60 which is used in teletherapy and research applications can be obtained without charge by writing Director, Office of Isotopes Development, U. S. Atomic Energy Commission, Washington 25, D. C.

□ Radiation detectors, essentially a thin slice of silicon, will be flown aboard simulated space-crew cabins in high altitude balloon ascents and in ICBM space flights. The devices, developed by Hughes Aircraft for the Air Force School of Aviation Medicine, San Antonio, Tex. emit pulses when struck by charged nuclear particles. ✓✓✓ An IBM 650 digital computer is being used by the Coast and Geodetic Survey to increase the accuracy of earthquake location, eventually to within seven miles of the point of origin. Data reported from some of the 200 earthquake detection stations in the world wide network is punched on standard business machine cards and fed into the computer. ✓✓✓ An unusual application of industrial turbo expanders developed by the Stratos Division of Fairchild Engine and Airplane is expected to aid in combat readiness of aircraft on the flight deck of the USS Enterprise, now under construction. The expanders will be used to pre-cool air from the ship's compressors for air cooling units to be installed on deck.

□ A number of products containing uranium or thorium would be exempt from AEC Domestic licensing requirements under a revised regulation now submitted to industry for comment. Included in the exemption are incandescent gas mantles, vacuum tubes and welding rods and some types of glazed ceramic tableware. Photographic films, negatives or prints containing uranium or thorium would be exempt; so would any finished product with tungsten-thorium alloys not exceeding 4 percent thorium by weight -- providing no treatment or processing was involved. Details are available from the Secretary, U. S. Atomic Energy Commission, Washington 25, D. C. Comments, in triplicate, should be submitted by Nov 7. ✓✓✓ A microvolt calibration console has been developed by the National Bureau of Standards for rapid, accurate measurement of low-level of outputs in the microvolt ranges. Details are available free from NBS Office of Technical Information, Washington 25, D. C.

□ Office of Naval Research, Washington 25, D. C. has signed a contract with Aerojet-General, Azusa, Calif. for design, development and fabrication of underwater rocket sled hardware and propellants. ✓✓✓ A combination of three plasma thermocouple cells placed in the core of a reactor has operated a conventional automobile fan for several hours at Los Alamos. The cells produced a combined open circuit potential of ten volts, an accomplishment said to demonstrate that higher power levels and more useful voltages can be obtained by the simple addition of cells. ✓✓✓ A Navy-Industry conference on Aeronautical Material Reliability, open by invitation only, will be held in Washington November 1-2. For information contact Mr. F. W. Snyder, Bureau of Naval Weapons, Department of the Navy, Washington 25, D. C. or phone OXford 6-4751. ✓✓✓ The National Science Foundation has granted \$125,490 for establishment of a Polar and Geophysical Research Center at the University of Wisconsin, Madison 6, Wis. Other grants have permitted the University to arrange purchase of an all-transistorized Control Data Corp. 1604 binary computer.

## ROYALTY FREE PATENTS

Here is a new listing of Government-owned patents now available for use by industry on a royalty-free basis. Subscribers desiring further information may write Service Department, Washington SCIENCE TRENDS, 1120 National Press Bldg., Washington 4, D. C.

You will be furnished with the patent number and classification, and information on where to obtain the patent, and where to apply for licensing.

- HIGH PRESSURE DIES: This patent describes a press for subjecting specimens of bismuth, urania, yttria or thoria to high pressures and temperatures.
- ELECTRON GUN: Novel transformer construction is used for this pulsed electron gun said to be capable of delivering pulses at voltages of the order of 1 mv, and currents of the order of 100 amperes.
- ARC WELDING APPARATUS: With this apparatus a welding arc is created between an annular electrode and a workpiece. It then moves under the influence of an electromagnetic field about the electrode in a closed or annular path.
- CHROMIUM ALLOY PLATING: This process is said to provide a decorative coating which can be buffed to a high luster, retain its hardness, and protect against corrosion. Electroplating with an aqueous bath is employed, making it possible to plate continuously for long periods of time.
- AIR CUTOFF VALVE: This device is used in systems in which air is supplied under constant pressure to pressurize fuel tanks. Operation is by variations in pressure.
- AUTOMATIC TRIPPING MECHANISM: This automatic limit and return tripping mechanism is said to be useful in navigational equipment. It employs two stable states for the actuation of microswitches which effect the temporary reversal of electrically operated devices.
- ELECTROPLATING ALUMINUM: Electroplating aluminum on metals from a nonaqueous bath is said to be feasible with this patent. It features a novel method of pretreating or conditioning the metal before electro-deposition.
- FREQUENCY STABILIZING SYSTEM: This patent covers an electronic control circuit with which a first signal frequency is held in synchronization with a second varying reference signal.
- JOINING ALUMINUM TO STAINLESS STEEL: This can be accomplished without a flux by tinning the aluminum with a tin solder containing 1% silver and 1% lead, and tinning the stainless steel with a 50% lead, 50% tin solder. Then you sweat the tinned surfaces together.
- STACKING WOODEN PALLETS: This patent applies to a special super-structure which permits the stacking of a number of ordinary wooden pallets.



## R E S E A R C H   C H E C K L I S T

- NICKEL-ALUMINUM COATINGS: Research for the Wright Air Development Center has led to development of nickel-aluminum alloy coatings said to be capable of protecting metals from oxidation at temperatures up to 1,000° C. Suitable protection for steel, nickel and molybdenum has already been demonstrated. The most durable coating was obtained by electroplating nickel over the basis metal, and then plating aluminum on the nickel at 700° C. A number of aeronautical and space applications are anticipated.

(Write National Bureau of Standards, Office of Technical Information, Washington 25, D. C. for further details of High-Temperature Nickel-Aluminum Coatings)

- HE SAFETY COATINGS: Resilient padding and a low-static-accumulating plastic coating, developed for the Atomic Energy Commission, is said to increase safety when high explosives are being machined. The padding reduces the probability of accidental detonation through impact while the coating prevents accumulation of high static voltages. The coating is based on a graphite-filled polyvinyl chloride plastisol system. It can be applied by dipping followed by oven fusion.

(R&D by J. Donahoe and J. Bell, CMB-6, Los Alamos Scientific Laboratory, Los Alamos, New Mexico)

- LANDING BAG SYSTEMS: Studies by the National Aeronautics and Space Administration indicate that gas-filled bags can be used to absorb landing shocks in lunar or planetary landings and may be particularly useful for manned spaceflight applications. However, a better method of controlled gas bleed is required -- the ideal technique would be through pressure-actuated orifices of variable area that could maintain constant pressure.

(Report available. Single Copies Free. Write NASA, BID, Washington 25, D. C. for NASA Technical Report R-75 -- Analytical Studies of Soft Landings on Gas-Filled Bags)

- LINE VOLTAGE AND NOISE MONITOR: Research by Phillips Petroleum for the Atomic Energy Commission has resulted in development of a Voltage and Noise Monitor to detect and record line disturbances. Such disturbances, in the form of slow voltage variations and/or fast noise transients are said to be an ever-present source of trouble in sensitive electronic instruments. The device was developed to provide a means of correlating spurious instrument response with power line disturbances. It also serves as an expanded scale recording voltmeter for alternating currents and as a momentary power outage indicator.

(Report available. 20 Pages. 50 Cents. Write OTS, U. S. Department of Commerce, Washington 25, D. C. for Report No. IDO-16608)

## P U B L I C A T I O N   C H E C K L I S T

- COMMITTEE ON SCIENCE AND ASTRONAUTICS, a brief staff report on the activities of this busy Congressional group. Discusses and summarizes major investigations during the year. Also includes a useful list of committee publications and reports. 11 Pages. Single Copies Free. (Write Committee on Science and Astronautics, New House Office Bldg., Washington, D. C. for Report on Activities, Serial k)
- PROTECTION AGAINST RADIATION, a basic handbook now revised to reflect modified recommendations as to the maximum permissible radiation exposure to man from sealed gamma-ray sources and discrete gamma-emitting sources that are not technically "sealed" but may be treated in the same manner. 70 Pages. 30 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for NBS Handbook No. 73)
- CHEMICAL KINETICS, HOMOGENEOUS REACTIONS, an index to previously published tables of chemical kinetics. This supplement provides a subject index, and both a class of reaction and class of compound alphabetical index. It also includes an explanation of the six-digit numbering system used in the tables. 37 Pages. 35 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for NBS Circular 510, Supplement No. 2)
- WATER SAMPLES, a Geological survey manual describing methods for collecting, preserving and analyzing water samples. Describes many new instruments and analytical techniques including 77 procedures for determining 53 properties of water. 301 Pages. \$1.50. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Geological Survey Water Paper No. 1454)
- WAR AND DETERRENCE, a study paper by Herman Kahn, Physics Division, the Rand Corporation on the "Nature and Feasibility of War and Deterrence." 37 Pages. Single Copies Free. (Write Subcommittee on Disarmament, U. S. Senate, Washington 25, D. C. for Senate Document No. 101)
- REDUCING TITANIUM TETRACHLORIDE, describes experiments by the Bureau of Mines to improve the extractive metallurgy of titanium through the use of high-surface sodium. 10 Pages. Single Copies Free. (Write Publication-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigation No. 5596)
- ROCKET PROPELLANTS, a compilation of approximately 290 abstracts of unclassified reports, most of which are available for sale to the public. References in the first section are divided into two broad subject areas of liquid or solid propellants. References in the section relate to specific compounds. 59 Pages. \$1.50. (Write OTS, U. S. Department of Commerce for PB 161 654-ASTIA)
- SCIENTIFIC AND TECHNICAL SERIALS, an incomplete list of magazines, journals and other serial publications on scientific and technical subjects received at the Library of Congress. Lists publications of both the U. S. and foreign countries. 186 Pages. Single Copies Free while supply lasts. (Write Science and Technology Division, The Library of Congress, Washington 25, D. C.)
- FEDERAL EDUCATIONAL POLICIES, PROGRAMS AND PROPOSALS, the first of three excellent volumes prepared by the Legislative Reference Service, Library of Congress. Includes much background information on government support of scientific and technical programs. 192 Pages. Single Copies Free. (Write Committee on Education and Labor, U. S. House of Representatives, Washington 25, D. C. for Federal Educational Policies Survey, Part I)

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